REMARKS

Claims 13-18 and 24-29 are pending in this application.

A new title has been adopted substantially in accordance with the Examiner's suggestion.

The Examiner contends that the application lacks the necessary reference to the prior application. This is not so. The Examiner's attention is respectfully directed to item No. 6 in the transmittal letter of the present application. A reference to the patented status of the prior application has been added hereinabove. The specification is further being amended to correct obvious typographical mistakes.

The Examiner's objection to the form of the preamble of the dependent claims is unclear. The Examiner suggests revising the claims to begin with "The method of ... ." However, the claims begin this way in their current form. An explanation is respectfully requested.

The Examiner objects under 35 U.S.C. 132 to the Preliminary Amendment of February 17, 2000. Specifically the Examiner objects to changes made in the ranges of Lb to La on page 20 of the specification as constituting new matter. The Examiner is respectfully requested to reconsider the requirement to cancel the pertinent section of the amendment for the following reasons.

All the changes made on page 20 to ranges of Lb/La are disclosed on page 6, line 2-4 of the specification. It should also be noted that the same changes were accepted in the prior application and appear in U.S. Patent No. 6,084,746, at col. 3, line 19 and/or at col. 9, line 37 et al. It is respectfully submitted that no new matter is disclosed. Applicant requests that the Examiner's requirement to cancel be reconsidered and that the amendment be entered.

Claims 13-18 and 24-29 stand rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims 13-18 and 25-29 have been amended to include positive antecedent basis. The recitation of rotating the magnetic head disc when the head IC chip is in operation has been shifted from the body of the claim to the preamble. Consequently, the scope of the claims has been clarified in that the present claimed invention is a method of fabricating a magnetic disc. Thus, the claims presented herein overcome the rejection and as now presented

particularly point out and distinctly claim the inventive subject matter. The Examiner is requested to withdraw the rejection.

The Examiner has rejected claims 13, 14, 17 and 18 under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 5,014,145 to Hosakawa et al. (the '145 patent) or by Japanese Patent Publication JP 6-195668 (JP '668). These and other claims stand rejected under 35 U.S.C. 103(a) as unpatentable over the '145 patent or JP '668 in view of U.S. Patent No. 4,443,824 to Frater (the '824 patent). Dependent claims 15 and 26 stand rejected under 35 U.S.C. 103(a) as unpatentable over either the '145 patent or JP '668 in view of the '824 patent and further in view of U.S. Patent No. 3,832,769 to Olyphant (the '769 patent).

The present claimed invention is a method of fabricating a magnetic head device including a suspension structure having one end that supports a slider. The slider has a magnetic head element that is used to access and write data on at least one rotating magnetic recording disc. A head IC chip is mounted on the suspension structure so as to face the magnetic recording disc. The disc spins at least when the head IC chip is in operation. Advantageously, the chip's mounting position is selected so that the head IC chip is always exposed to a flow of air produced by the rotation of the magnetic disc when it is in operation. Thus, the head chip is cooled by the air flow during its operation.

Neither the '145 patent nor JP '668 teach, disclose, or suggest the claimed method of fabricating the magnetic head device. The '145 patent discloses a support structure including a servo head arm 31 having a flexible circuit 9 disposed thereon. An amplifier 8 in the form of a packaged IC is mounted on the flexible circuit 9. The '145 patent does not disclose the location of the IC package nor does it refer to heat dissipation and/or any thermal influence the IC has on the magnetic head. This may be because packaged IC's are typically made to have an increased heat dissipating surface area because of the packaging and thus a substantial thermal capacity. Furthermore, it is also noteworthy that in the '145 patent the IC is not shown as facing the disc. This is a significant feature of the present claimed invention. Thus, the '145 patent does not teach, disclose, nor suggest cooling the IC chip on a magnetic head device by exposing it to a flow of air produced by the rotation of the magnetic disc.

Additionally, the structure of the '145 patent referred to by the Examiner as that of an "IC chip . . . located inside an outer periphery of the magnetic disc" may well be coincidental

with respect to cooling, and indicates patentee's lack of possession of the present invention. For example as seen in Fig. 4, amplifier 8 is located far from the rotating disc media 7. Prior art must be considered in its entirety, including the disclosure, as here that the IC is a packaged IC, that teach away from the claims. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, cert. denied 469 U.S. 851 (1984). The structure disclosed by the '145 patent, with its packaged IC's, does not lend itself to cooling by air flow generated by the rotating disc. Thus, the present invention which includes selecting a mounting position of the head IC chip is clearly patentable over this reference.

JP '668 discloses a head device and in particular a head moving device that is an assembly of a cooperating head carriage 1 (Fig. 1 et al.) and head arm 2 (Fig. 5 et al.), both made of a metallic material such as steel or aluminum. IC 28 or IC 36 are mounted on carriage 1 or arm 2, respectively, at locations that reduce undesirable electrical noise, i.e. improving noise resistance performance.

Fig. 7 illustrates the completed assembly. The location of the IC chip is seemingly unrelated to the location of the magnetic disc 7. IC 28 on the lower carriage 1 is located proximal to magnetic head 5. The magnetic head 6 for the upper arm 2 is located directly above head 5 on the other side of the magnetic disc 7, but IC 36 of the upper arm is located significantly further from head 6 than the space between IC 28 and head 5, and the location of neither IC is based on their position relative to disc 7. When comparing the circuit layout of carriage 1 in Figs. 1 and 2, and arm 2 in Figs. 5 and 6; it becomes clear that the respective IC chips locations are chosen to minimize the signal travel length from the respective heads rather than for any convective cooling effects from the magnetic disc. In other words, JP '668 teaches that locating the IC chips is dependent on factors other than convective cooling. Further, on arm 2, IC chip 36 is located distal behind a second IC chip which makes no sense if cooling by air flow was a requirement for position selection.

JP '668 does not discuss at all the selection of a specific mounting position for the IC's. Moreover, the reference is not concerned with heat dissipation and the thermal influence of the IC on the magnetic head. This reference is concerned with noise reduction.

Thus, it is clear that JP '668 does not teach, disclose, nor suggest advantageously locating IC's in the air flow produced by the rotating disc in order to dissipate heat in the IC. Accordingly, the claims are patentable over this reference.

The '824 patents discloses a support structure 10 comprising two C-shaped channels 12 and 14 joined at a portion distal from the magnetic heads 44. Magnetic heads 44 mounted on further supports 38, 42 are supported at a bridge 18 at the proximal end of arm 10. Each C-channel has a base formed with a series of apertures 68 provided for reducing the mass of the dies cast arm 10. Two electronic modules 52 and 54 are affixed to the arm 10 at its distal end from heads 44.

The '824 patent does not teach, disclose, nor suggest the novel cooling approach of determining the mounting position of the IC chip so that the IC chip is always exposed to a flow of air produced by rotation of the magnetic disc. While, in arm 10 apertures 68 allow air flow through the arm, the '824 patent does not disclose how the air flow is achieved. Cooling by air flow is well known. Thus, the key factor is not the fact that air is used as a cooling medium, but rather how the inventor locates the objects to be cooled so that they benefit from air flow produced by the rotating magnetic disc.

From the structure disclosed in the '824 patent, it is readily apparent that the air flow produced by the rotation of the disc cannot effectively reach the electronic circuit modules 52 and 54 because the modules are simply located too far from the magnetic heads 44 and, therefore, from the magnetic disc. It is instructive to compare applicant's location of the advantageously positioned IC chip 20 with respect to the magnetic disc and the location of the disc in this reference. Specifically, modules 52 and 54 of the reference are located well away from the rotating disc. Thus, the '824 patent does not disclose selecting the location of the IC to effect its cooling by disc rotation.

The arguments presented above have clearly shown that the pending claims are not anticipated by either the '145 patent or JP '668. Also, the '824 patent fails to bridge the gap between the present claimed invention and either of the primary references. The same comment applies to the '769 patent which was cited only for its disclosure of flip-chip bonding.

Furthermore, none of the above mentioned references, when applied singly or in combination teach, disclose, or suggest the feature of selecting a mounting position for IC's that is located in the air flow produced by the rotating magnetic disc. Before a rejection can be made under 35 U.S.C. 103, some motivation for the artisan to make the suggested modification must be shown. The person of ordinary skill does not have the have the current application in front of him when considering the modifications. Here, there is no reason why one skilled in the art would indeed or should modify the prior art to arrive at the present claimed invention. This is particularly

true when, as here, the disclosed prior art inventions teach away from the claimed invention or fail to encompass a particular part of the invention.

Based on all of the above, it is respectfully submitted that the present application is in condition for allowance. Prompt and favorable action to that effect is respectfully solicited.

It is believed that no fees or charges, other than those for the extension of time, are required at this time in connection with the present application. However, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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AMENDMENTS TO THE TITLE, SPECIFICATION, AND CLAIMS SHOWING CHANGES

In the Title:

Please replace the title in its entirety with the following title:

[Magnetic Head Disc]A Method of Fabricating a Magnetic Head Device

In the Specification:

Please replace the paragraph starting on page 3c, line 19 in its entirety with the following paragraph:

Another aspect of the present invention is directed to a method of fabricating a magnetic disc device comprising a magnetic head device including a slider having a magnetic head element and a suspension structure having one end supporting the slider, a rotatable magnetic disc, a head IC chip which is a separately-formed component from the slider, and an electrically conductive connecting device for establishing an electrical connection between the magnetic head element and the head IC chip. The head IC chip is mounted on the connecting device so as to face the magnetic disc which is rotated at least when the head IC chip is in operation. The mounting position of the head IC chip on the connecting device is selected to be where the head IC chip is always exposed to a flow of air produced by [notations] rotations of the magnetic disc so that the head IC chip is continuously cooled by the flow of air at least when the head IC chip is in operation. The head IC chip is arranged to be located with respect to the magnetic disc with a distance between opposing surfaces of the head IC ship and the magnetic disc smaller than 1000 μm.--

Please replace the paragraph starting on page 13, line 25 in its entirety with the following paragraph:

In the illustrated embodiment, the flexure member 30 is made of a sheet of a corrosion resistant steel (for example, SUS304TA) of approximately 25 [mm] μm thick. The

flexure member 30 is smaller in width than the load beam 31. To provide the flexure member 30 with a corrosion resistant steel sheet as described is advantageous as compared with a structure wherein the flexure member is totally made of plastics material. Where the flexure member is totally made of plastics material, flatness of the slider attachment surface may very often not be satisfactory, and the slider attachment surface may be accurately parallel with the movable arm attachment surface. By providing the flexure member 30 with a corrosion resistant steel as described, the aforementioned problems can be avoided.

In the Claims:

Please amend claims 13-18 and 25-29, inclusive, as follows:

13. (Amended) A method of fabricating a magnetic disc device comprising a magnetic head device including a slider having a magnetic head element and a suspension structure having one end supporting the slider,[a rotatable magnetic disc,] a head IC chip which is a separately-formed component from the slider, a rotatable magnetic disc which is rotated at least when the head IC chip is in operation, and an electrically conductive connecting device for establishing an electrical connection between the magnetic head element and the head IC chip, the method including the steps of;

mounting the head IC chip on the connecting device at a mounting position so as to face the magnetic disc;

[rotating the magnetic disc at least when the head IC chip is in operation;] and

selecting the mounting position of the head IC chip on the connecting device to be located where the head IC [Chip] chip is always exposed to a flow of air produced by rotations of the magnetic disc so that the head IC chip is continuously cooled by the flow of air at least when the head IC chip is in operation.

14. (Amended) The method of claim 13 wherein the step of mounting [a] the head IC chip on [a] the suspension structure includes mounting the head IC chip which is a bare chip.

15. (Amended) The method of claim 13 wherein the step of mounting [a] the head IC chip on [a] the suspension structure includes mounting the head IC chip on the suspension structure by flip-chip-bonding.

16. (Amended) The method of claim 13 wherein the step of mounting [a] the head IC chip on [a] the suspension structure includes mounting the head IC chip which has a mass smaller than 1.0 mg.

17. (Amended) The method of claim 13 wherein the step of selecting [a] the mounting position of a head IC chip includes selecting the mounting position of the head IC chip so that the head IC chip is located inside an outer periphery of the magnetic disc at least when the head IC chip is in operation.

18. (Amended) A method of increasing cooling of a head IC chip in a magnetic disc device comprising a magnetic head device including a slider having a magnetic head element and a suspension structure having one end supporting the slider,[a rotatable magnetic disc,] a head IC chip which is a separately-formed component from the slider, a rotatable magnetic disc which is rotated at least when the head IC chip is in operation, and an electrically conductive connecting device for establishing an electrical connection between the magnetic head element and the head IC chip, the method including the steps of:

mounting the head IC chip on the connecting device at a mounting position so as to face the magnetic disc;

[rotating the magnetic disc at least when the head IC chip is in operation;] and

selecting the mounting position of the head IC chip to be located on the connecting device where the head IC chip is always exposed to a flow of air produced by rotations of the magnetic disc so that the head IC chip is continuously cooled by the flow of air at least when the head IC chip is in operation.

25. (Amended) The method of claim 24 wherein the step of mounting a head IC chip on [a] the suspension structure includes mounting the head IC chip which is a bare chip.

26. (Amended) The method of claim 24 wherein the step of mounting a head IC chip on [a] the suspension structure includes mounting the head IC chip on the suspension structure by flip-chip-bonding.

27. (Amended) The method of claim 24 wherein the step of mounting [a] the head IC chip on [a] the suspension structure includes mounting the head IC chip which has a mass smaller than 1.0 mg.

28. (Amended) The method of claim 24 wherein the step of selecting [a] the mounting position of [a] the head IC chip includes selecting the mounting position of the head IC chip so that the head IC chip is located inside an outer periphery of the magnetic disc at least when the head IC chip is in operation.

29. (Amended) A method of increasing cooling of a head IC chip in a magnetic disc device comprising a magnetic head device including a slider having a magnetic head element and a suspension structure having one end supporting the slider,[a rotatable magnetic disc,] a head IC chip which is a separately-formed component from the slider, a rotatable magnetic disc which is rotated at least when the head IC chip is in operation, and an electrically conductive connecting device for establishing an electrical connection between the magnetic head element and the head IC chip, the method including the steps of:

mounting the head IC chip on the connecting device at a mounting position so as to face the magnetic disc;

[rotating the magnetic disc at least when the head IC chip is in operation;]

selecting the mounting position of the head IC chip to be located on the connecting device where the head IC chip is always exposed to a flow of air produced by rotations of the magnetic disc so that the head IC chip is continuously cooled by the flow of air at least when the head IC chip is in operation; and

arranging for the head IC chip to be located with respect to the magnetic disc with a distance between opposing surfaces of the head IC chip and the magnetic disc smaller than 1000 μm.